

# The Ups and Downs of Life on Frozen Ground

## ALASKA SCIENCE FORUM

June 2, 1999 (Article #1443)

by Ned Rozell

Creeping glaciers, ash-spouting volcanoes, and persistent earthquakes that rearrange the landscape make Alaska an exciting place to live. A less dramatic feature of Alaska's landscape, permafrost, is also changing Alaska as it slowly disappears.

Permafrost, ground that remains frozen all year, forms a foundation for about 85 percent of Alaska. From Barrow to Anchorage, most of the ground beneath our feet contains frozen soil and ice that sits in spaces between soil grains or takes the shape of wedges, lenses, and veins.

North of the Brooks Range, permafrost is generally found everywhere you might sink a drill. Farther south, permafrost is spotty but still plentiful. Alaskans have adapted to the challenge of building on permafrost with clever engineering tricks, but a warmer climate might soon make all our adaptations pointless.

Tom Osterkamp and Vladimir Romanovsky think permafrost might soon be on the minds of all Alaskans, and not just when they drive over waves of asphalt created by melting beneath. Osterkamp, a professor of physics at the Geophysical Institute, and Romanovsky, a research assistant professor here, just wrote a paper on the condition of Alaska's permafrost. The verdict: permafrost south of the Yukon River is quite near the thawing point, and, without a dramatic turn in climate, Alaskans are in for a messy transition.

For more than 20 years, Osterkamp has checked the temperature of permafrost using holes drilled in the ground on a transect paralleling the trans-Alaska pipeline. These "permafrost observatories" are also located in Anchorage, Barrow, Bethel, Bettles, Kaktovik, Nome, Kotzebue, Healy, and Eagle. The holes are from 100 feet to 200 feet deep, and with them Osterkamp and Romanovsky have been able to track the fate of permafrost for the last two decades.

Most permafrost south of the Yukon River is within two degrees Celsius of thawing. If a warming trend that began in the winter of 1976 – 1977 continues, the permafrost will melt. While getting the ice out of the soil may seem like a welcome relief to those who build roads, houses, bridges, and pipelines, it will be a bad thing for the thousands of people who now live on houses above permafrost and use roads, bridges, and pipelines built over permafrost.

Air temperatures in Fairbanks have increased 1.5 degrees Celsius in the last 20 years. During the same period, Bettles warmed by 1.4 degrees Celsius and Gulkana by 1.3 degrees Celsius. If the increase is consistent for the next 20 years, Alaskans are going to notice a dramatic difference in the world around us. Roads will slump, floors will slant, and huge sinkholes will appear in forests, swallowing trees and creating new lakes.

"The transition period will create whole new ecosystems," Romanovsky said. "It's a disaster for us, but not for nature."

And who's to blame for melting permafrost? Is it the species building the houses, roads, and pipelines? That's the big question—are humans causing global warming, or is the warming we've seen in Alaska since the 1970s a natural variation, one that could quickly reverse itself and preserve all this permafrost? Maybe the warming is a quirk of nature unaffected by man. Maybe not. All we know now is that one of Alaska's most visible signs of climate change is thawing right under our feet.

*Science Forum articles are a public service of the Geophysical Institute, University of Alaska Fairbanks, in cooperation with the UAF research community. Ned Rozell is a science writer at the institute.*

[www.gi.alaska.edu/ScienceForum/](http://www.gi.alaska.edu/ScienceForum/)

